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PTO/SB/21 (09-06)

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TRANSMITTAL FORM		Application Number		09/975,518	
(to be used for all correspondence after initial filing)		Filing Date		October 11, 2001	
		First Named Inventor		Samir Kapoor	
		Art Unit		2616	
		Examiner Name		Robert W. Wilson	
Total Number of Pages in This Submission		Attorney Docket Number		11722US02	
ENCLOSURES (check all that apply)					
<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53		<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input checked="" type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD		<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Return-Receipt Postcard <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):	
Remarks		Petition to Withdraw a Holding of Abandonment Under 37 CFR 1.181(a) with Appendix A and Appendix B			
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT					
Firm or Individual Name		McAndrews Held & Malloy, Ltd.			
Name (Print/type)		Joseph M. Barich		Registration No. (Attorney/Agent) 42,291	
Signature				Date: May 8, 2007	
EXPRESS MAIL DEPOSIT					
"Express Mail" mailing label number : EV 219881506 US Date of Deposit May 8, 2007.					



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of:

Samir Kapoor

Application No.: 09/975,518

EV 219881506 US

Express Mail No.

Filed: October 11, 2001

For: METHOD AND APPARATUS FOR
INTERFERENCE SUPPRESSION
IN ORTHOGONAL FREQUENCY
DIVISION MULTIPLEXING
(OFDM) WIRELESS
COMMUNICATION SYSTEMS

May 8, 2007

Date

Examiner: Robert W. Wilson

Group Art Unit: 2616

PETITION TO WITHDRAW A HOLDING OF ABANDONMENT
UNDER 37 CFR 1.181(a)

Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Office Of Petitions:

This Petition to withdraw the holding of abandonment is filed in response to a Notice of Abandonment mailed by the PTO on March 20, 2007. This Petition is timely because it is being filed within two months of the mailing date of the Notice of Abandonment. Please enter and consider the following:

REMARKS

In the present application, the PTO mailed an Office Action on October 27, 2005. As further described below, an Amendment in response to the Office Action was timely fax-filed with the PTO on February 10, 2006 with the appropriate extension of time. However, the Amendment filed February 10, 2006, was not scanned into the correct application in PAIR and was apparently misplaced and/or misfiled by the PTO, as further described below. Thus, the Examiner in the present application was unable to find the Amendment filed February 10, 2006. Consequently, a Notice of Abandonment was mailed March 20, 2007. However, after the mailing of the Notice of Abandonment, the Amendment filed February 10, 2006 was apparently re-discovered by the PTO and was apparently scanned in on April 26, 2007 as a PAIR entry for the present application.

More specifically, the Amendment of February 10, 2006 currently appears in the PTO's PAIR system and enclosed please find as "APPENDIX A" a print out from the PTO's PAIR system of the Amendment of February 10, 2006. It is noted that the PTO's records show that the Amendment of February 10, 2006 was received on February 10, 2006 as evidenced by 1) the first page of the Amendment shows a stamp on the upper right corner stating "Received central fax center FEB 10 2006" and 2) each page of the Amendment includes a fax time stamp at the bottom that shows the fax was received by the PTO on February 10, 2006.

It is noted that each of the pages appearing in PAIR includes at the bottom the legend "Copied from 09975578 on 04/26/2007." In this regard, it is noted that the application number of the present application is 09/975,518 and not 09/975,578. Consequently, it is suspected that

Application No. 09/975,518
Attorney Docket No. 11722US02

the Amendment of February 10, 2006 was misfiled in the "578" application and was only recently discovered to have been misfiled on or about April 26, 2007.

More specifically, it appears that when the Examiner mailed the Notice of Abandonment in the present application on March 30, 2007, the misfiling of the Amendment of February 10, 2006 had not yet been discovered. Consequently, the Examiner was unable to find the Amendment of February 10, 2006. However, the misfiling of the Amendment of February 10, 2006 has now been discovered and the Amendment of February 10, 2006 was apparently entered into PAIR for the present application on or about April 26, 2007.

It was upon reviewing the PAIR records for the present application in order to prepare the present Petition that the Applicant discovered that the Amendment of February 10 2006 had apparently been added on April 26, 2007, after the mailing of the Notice of Abandonment on March 20, 2007. The Applicant then proceeded to call Examiner Wilson to attempt to resolve the situation. However, the Examiner suggested that the Applicant proceed with filing the present Petition.

In summary, the Amendment filed February 10, 2006 in response to the Office Action of October 27, 2005 now appears in the PAIR records for the present application. Consequently, the Applicant respectfully requests that the present application is not abandoned and that the Notice of Abandonment of March 20, 2007 be withdrawn.

Typically, when an Amendment is fax filed with the PTO and then misplaced by the PTO, the Applicant would proceed with a Petition to Withdraw a Holding Of Abandonment under 37 CFR 1.8(b) and include a copy of the previously filed Amendment and attest that the

Application No. 09/975,518
Attorney Docket No. 11722US02

Amendment had been previously filed. However, because the PTO has already re-discovered the Amendment of February 10, 2006 and added the Amendment to the file history of the present application, it is not certain whether the present Petition should be proceeding under 37 CFR 1.8(b) or some other section. However, as a backstop, the Applicant has complied below with the requirements of 37 CFR 1.8(b).

Consequently, enclosed please find as "APPENDIX B" a copy of the Amendment that was filed with the PTO on February 10, 2006 in response to the Office Action of October 27, 2005. Also included is the PTO's auto-reply facsimile transmission that was received by the Applicant. The auto-reply shows the date stamp of February 10, 2006, identifies that all 28 pages were received by the PTO, and includes a reproduction of the first page of the Response that identifies the Examiner and Attorney Docket Number. Additionally, the Certificate of Facsimile Transmission under 37 CFR 1.8 appears on the first page of the Response. Also enclosed is a copy of a print-out from the Applicant's fax machine indicating the all 28 pages were successfully transmitted to the PTO on February 10, 2006.

Thus, in compliance with 37 CFR 1.8(b), the Applicant hereby 1) informs the PTO of the previous transmission, 2) supplies the enclosed additional copy of the previously transmitted correspondence, and 3) provides a copy of the Applicant's report confirming transmission to the PTO. Additionally, a copy of the PTO's official Auto-Reply Facsimile Transmission confirming transmission is enclosed.

Consequently, a withdrawal of the current holding of abandonment is respectfully requested in the present application.

Application No. 09/975,518
Attorney Docket No. 11722US02

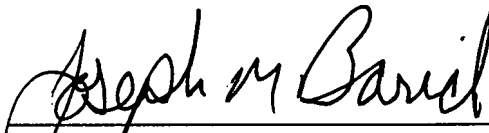
CONCLUSION

If the Office of Petitions has any questions or the Applicant can be of any assistance, the Office of Petitions is invited and encouraged to contact the Applicant at the number below.

The Commissioner is authorized to charge any necessary fees or credit any overpayment to the Deposit Account of McAndrews, Held & Malloy, Account No. 13-0017.

Respectfully submitted,

Date: May 8, 2007



Joseph M Barich
Registration No. 42,291

MCANDREWS, HELD & MALLOY, LTD.
500 West Madison Street, 34th Floor
Chicago, IL 60661

Telephone: (312) 775-8000
Facsimile: (312) 775-8100



APPENDIX A



FEB 10 2006 16:19 3127758100

#6059 P.001



McANDREWS, HELD & MALLOY
34TH FLOOR
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CHICAGO, ILLINOIS 60661

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TO:	Robert W. Wilson	FAX NO.:	(571) 273-8300
FROM:	Adam J. Faier	USER ID:	8139
CLIENT:	1021	MATTER:	11722US02

Number of Pages This Transmission (Including Cover Page): 28

I hereby certify that the attached:

Transmittal Form

Amendment

Petition for Extension of Time Under 37 CFR 1.136(a)

Six (6) Sheets of Replacement Drawings

Terminal Disclaimer to Obviate a Double Patenting Rejection over a "Prior" Patent

are being facsimile transmitted to the United States Patent and Trademark Office on February 10, 2006.


Adam J. Faier

If you have problems receiving this facsimile transmission, please contact the sender at the above telephone number.



FEB 16:20 3127758100

#6059 P.002

PTO/SB/21 (09-04)

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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	975378 09/23/548	
	Filing Date	October 11, 2001	
	First Named Inventor	Samir Kapoor	
	Art Unit	2661	
	Examiner Name	Robert W. Wilson	
Total Number of Pages in This Submission	27	Attorney Docket Number	11722US02

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FEB 8 2006**ENCLOSURES (check all that apply)**

<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input checked="" type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input checked="" type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input checked="" type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Return-Receipt Postcard <input type="checkbox"/> Other Enclosure(s) (please identify below):
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm	McAndrews Held & Malloy, Ltd.
Signature	<i>Adam J. Faier</i>
Printed Name	Adam J. Faier
Date	February 10, 2006

CERTIFICATE OF FAX TRANSMITTAL

I hereby certify that this correspondence is being sent via facsimile to Robert W. Wilson at (571) 273-8300 at the United States Patent and Trademark Office

Name (Print/type)	Adam J. Faier	Registration No. (Attorney/Agent)	56,898
Signature		Date	February 10, 2006

Document code: WFEE

United States Patent and Trademark Office
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#6059 P.003

Attorney Docket No.: 11722US02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of:

Samir Kapoor et al.

Serial No.: 09/975,518

Filed: October 11, 2001

For: METHOD AND APPARATUS FOR
INTERFERENCE SUPPRESSION IN
ORTHOGONAL FREQUENCY
DIVISION MULTIPLEXING (OFDM)
WIRELESS COMMUNICATION
SYSTEMS

Examiner: Wilson, Robert W.

Group Art Unit: 2661

Conf. No.: 9275

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CERTIFICATION OF FACSIMILE TRANSMISSION

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Adam J. Faier

Signature

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Examiner Wilson:

This Amendment is being submitted in response to the Office Action mailed October 27, 2005. This Amendment is timely because it is being submitted with a one month extension of time to extend the period for reply until February 27, 2006. The Applicant requests that this Amendment be entered and considered.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) In a multi-point communications system having a receiver and transmitter disposed at a primary site for communication with a plurality of remote units disposed at respective secondary sites, an antenna comprising:

multiple elements for receiving communications signals over a carrier frequency from ~~[[a]]~~ said plurality of remote units, said elements being partitioned into a plurality of groups disposed remote from one another by at least a predetermined minimum group spacing sufficient to obtain spatial diversity, each group containing at least one element, at least one group including multiple elements located proximate to one another and no further apart than a predetermined maximum element spacing to facilitate spatial filtering.

2. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said predetermined maximum element spacing is no more than one-half times a wavelength corresponding to the carrier frequency.

3. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said predetermined minimum group spacing is at least five times a wavelength corresponding to the carrier frequency.

4. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said multiple elements constitute an adaptive antenna array and each group constitutes a sub-array.

5. (Currently Amended) The ~~antenna~~ communication system of claim 1, further comprising means for electronically steering said multiple elements.

6. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said multiple elements constitute a switched beam antenna array.

7-28. (Cancelled)

29. (Currently Amended) A multi-point communications network comprising:
a receiver and transmitter disposed at a primary site;

a plurality of remote units disposed at respective secondary sites for communication with said receiver and transmitter at said primary site;

said primary site having an antenna including multiple elements for receiving communications signals over a carrier frequency from [[a]] said plurality of remote units, said elements being partitioned into a plurality of groups disposed remote from one another by at least a predetermined minimum group spacing sufficient to obtain spatial diversity, each group containing at least one element, at least one group including multiple elements located proximate to one another and no further apart than a predetermined maximum element spacing to facilitate spatial filtering.

30. (Original) The network of claim 29, wherein said predetermined maximum element spacing is no more than one-half times a wavelength corresponding to the carrier frequency.

31. (Original) The network of claim 29, wherein said predetermined minimum group spacing is at least five times a wavelength corresponding to the carrier frequency.

32. (Original) The network of claim 29, wherein said multiple elements constitute an adaptive antenna array and each group constitutes a sub-array.

33. (Original) The network of claim 29, wherein said antenna further comprises means for electronically steering said multiple elements.

34. (Original) The network of claim 29, wherein said multiple elements constitute a switched beam antenna array.

35. (Currently Amended) An adaptive antenna array architecture for communication, said architecture comprising:

a plurality of adaptive antenna arrays for signal reception, wherein said plurality of antenna arrays comprise a plurality of sub-arrays, wherein each sub-array includes at least two elements, wherein elements in said sub-arrays are no further apart than a predetermined maximum element spacing to facility spatial filtering, wherein said sub-arrays are spaced to obtain spatial diversity;

an array fixation structure for mounting said plurality of adaptive antenna arrays;

an array support structure for positioning said array fixation structure at a desired elevation; and

a base station for controlling said adaptive antenna array architecture.

36. (Cancelled)

37. (Cancelled)

38. (Previously Presented) A signal receiver for receiving communications signals, said receiver comprising:

an adaptive array for receiving signals from remote units;

a plurality of demodulator units for processing said signals;

a plurality of beamformers for constructing a desired signal response; and

a spatial diversity combiner for removing interference from said signals.

39. (Previously Presented) The receiver of claim 38, further comprising a direction of arrival processor for calculating a direction of arrival for said signals.

40. (Previously Presented) The receiver of claim 38, further comprising an orthogonal frequency division multiple access unit for segmenting available bandwidth into a plurality of frequency bins for allocation.

41. (Previously Presented) A method for reducing signal interference, said method comprising:

assigning at least one frequency bin to a user;

spacing said at least one frequency bin belonging to said user to at least one sufficiently different frequency to reduce inter-bin interference; and

locating said at least one frequency bin with at least one frequency bin of other users such that directions of arrival for said users are distinctly separable.

42. (Cancelled)

43. (Currently Amended) A method for allocating communication bandwidth, said method comprising:

determining a first direction of signal arrival for a first remote user and a second direction of signal arrival for a second remote user;

assigning [[a]] said first remote user to a first frequency bin; and

assigning [[a]] said second remote user to a second frequency bin based at least in part on said directions of signal arrival such that directions of signal arrival for adjacent frequency bins differ.

44. (Previously Presented) A method for avoiding interference in communications signals, said method comprising:

partitioning available bandwidth into a plurality of frequency blocks, said frequency blocks comprising a plurality of bins;

assigning a user to a bin in each of said frequency blocks; and

using signal power information to distribute said bins within said frequency blocks.

AMENDMENTS TO THE DRAWINGS

Six sheets of drawings are attached. These drawing sheets include formal drawings and replace the prior informal drawings originally submitted.

Attachment: Six (6) Replacement Sheets

REMARKS

The present application includes claims 1-6 and 29-44. Claims 1-6 and 29-44 have been rejected by the Examiner. Claims 2-6 were objected to. By this Amendment, claims 1-6, 29, 35 and 43 have been amended. By this amendment, claims 36-37 and 42 have been cancelled.

Claims 1-6 and 29-34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti et al., U.S. Pat. No. 5,933,421 ("Alamouti") in view of Gardner et al., U.S. Pat. No. 5,260,968 ("Gardner").

Claims 35-36 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece et al., U.S. Pat. No. 5,771,024 ("Reece").

Claim 37 was rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece further in view of Gardner.

Claims 38-39 were rejected under 35 U.S.C. 102(b) as being anticipated by Paulraj et al., U.S. Pat. No. 5,345,599 ("Paulraj").

Claim 40 was rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Gardner.

Claim 41 was rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Bossard, U.S. Pat. No. 5,983,078 ("Bossard").

Claims 42-43 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Ward et al., U.S. Pat. No. 6,104,930 ("Ward").

Claim 44 was rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Song et al., U.S. Pat. Pub. No. 2003/0193917 ("Song").

Claims 2-6 were objected to because of an informality.

New corrected drawings in compliance with 37 C.F.R. 1.121(d) were required.

Claims 42-43 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424.

Claims 41 and 44 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424 in view of Bossard.

The Applicant now turns to the rejection of claims 1-6 and 29-34 under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Gardner. Alamouti generally relates to frequency division duplex communications. However, as noted by the Examiner in the Office Action, Alamouti does not teach the limitations recited in claims 1 and 29 of a single antenna including a plurality of groups spaced apart sufficiently to provide spatial diversity AND at least one group including a plurality of antenna elements spaced closely enough to provide spatial filtering.

More specifically, claims 1 and 29 recite an antenna structure, wherein the antenna structure includes a plurality of antenna element groups. The plurality of groups are spaced apart at a distance sufficient to provide spatial diversity. However, at least one group includes a plurality of antenna elements. Within the group, the antenna elements are spaced close enough together to provide spatial filtering. Thus, there are two constraints (the group spacing and the element spacing), that are met in the single antenna that is recited in claims 1 and 29. Conversely, prior art antennas were typically designed to meet only one of the two constraints and not both.

Thus, Gardner teaches, at col. 6, lines 5-26, separating antennas by about half of the wavelength. Gardner specifically differentiates itself from the prior art which it mentions teaches spacing the antennas many wavelengths apart. Thus, Gardner chooses to optimize a different constraint than the prior art. However, neither Gardner nor the prior art it references teaches designing an antenna to simultaneously meet BOTH design constraints. Conversely, both Gardner and the prior art are designed to only meet one or the other of the two design constraints identified above.

Thus, the limitations recited in independent claims 1 and 29 of a single antenna including a plurality of groups spaced apart sufficiently to provide spatial diversity AND at least one group including a plurality of antenna elements spaced closely enough to provide spatial filtering are not shown in the either Alamouti or Gardner. With regard to Alamouti, the Examiner states in the Office Action that the claim limitation is not shown. With regard to Gardner, Gardner only teaches an antenna designed to meet one constraint, not both.

Consequently, independent claims 1 and 29, and their corresponding dependent claims 2-6 and 30-34, are respectfully submitted to be in condition for allowance. Similarly, independent claim 35 has been amended to recite similar limitations to the limitations in claims 1 and 29 and is consequently also respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claims 35-36 under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece. Independent claim 35 has been amended to incorporate the limitations similar to those in claims 1 and 29 discussed above. The limitations added to claim 35 were similar to the limitations recited in dependent claims 36 and 37.

Consequently, claims 36 and 37 have been cancelled. As discussed above with regard to claims 1 and 29, amended claim 35 is also respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 37 under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece further in view of Gardner. Claim 37 has been cancelled.

The Applicant now turns to the rejection of claims 38-39 under 35 U.S.C. 102(b) as being anticipated by Paulraj. Paulraj generally relates to increasing capacity in wireless broadcast systems using distributed transmission/directional reception. More specifically, as illustrated in Fig. 5 and discussed beginning at col. 7, line 68, Paulraj discusses that the spatial filter consists of d processing channels, one for each transmitted signal, where each processing channel selectively passes the one desired signal and rejects other interfering signals. That is, the spatial filter in Paulraj does not combine the signals. Rather, the output signals from the spatial filter are processed into d substreams corresponding to the outputs of the signal splitter at the transmitting side. The substreams are fed into a combiner which merges the streams. As explained at col. 10, lines 28-36, the substreams are combined to obtain the estimated source stream. The combiner essentially reverses the operation of the signal splitter on the transmitting side. That is, the combiner in Paulraj does not remove interference from signals.

However, Paulraj does not disclose a combiner for removing interference from signals. Rather, as discussed above, Paulraj merely discloses a spatial filter including processing channels that selectively pass one desired signal while rejecting other interfering signals. Further, the

combiner in Paulraj merely combines substreams to obtain the estimated source stream. Thus, Paulraj does not disclose a combiner for removing interference from signals.

Independent claim 38 recites a spatial diversity combiner for removing interference from signals. As discussed above, Paulraj does not teach a spatial diversity combiner. Consequently, independent claim 38 and corresponding dependent claim 39 are respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 40 under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Gardner.

As discussed above, Paulraj generally relates to increasing capacity in wireless broadcast systems using distributed transmission/directional reception. However, as discussed above, Paulraj does not disclose a combiner for removing interference from signals. Rather, as discussed above, Paulraj merely discloses a spatial filter including processing channels that selectively pass one desired signal while rejecting other interfering signals.

As discussed above, Gardner generally relates to multiplexing communications signals through blind adaptive spatial filtering. Gardner discusses beginning at col. 13, line 45, a splitter/combiner coupled to an antenna in an antenna array. The splitter/combiner includes a pair of bandpass filters, the outputs of which are coupled to a controller. The splitter/combiner is used to separate the spectrally disjoint control signals received from and transmitted to the mobile user and to separate the control channel from the band occupied by active users. The control channel is used for call initiation and coordination between the user and the base station.

However, Gardner does not disclose a combiner for removing interference from signals. Rather, as discussed above, the combiner disclosed in Gardner is used to separate control signals received from and sent to remote users.

Independent claim 38, from which claim 40 depends, recites a spatial diversity combiner for removing interference from signals. As discussed above, Paulraj does not teach such a spatial diversity combiner. Further, as discussed above, Gardner does not teach such a spatial diversity combiner. Thus, neither Paulraj nor Gardner, alone or in combination, teach or suggest elements of claim 40. Consequently, dependent claim 40 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 41 under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Bossard.

As discussed above, Gardner generally relates to multiplexing communications signals through blind adaptive spatial filtering. However, the Applicant agrees with the Examiner's statement in the Office Action that Gardner does not teach or suggest spacing the frequency bins to reduce inter-bin interference.

Bossard generally relates to channel spacing for distortion reduction. More specifically, as explained at col. 1, lines 17-22, Bossard relates to transmitting multiple signals over a large number of channels, where two or more of the channels are affected by a component which produces intermodular distortion from the interaction of the signals of these channels. That is, intermodular distortion in Bossard is produced by the transmitting component that is transmitting many signals. Bossard discusses beginning at col. 2, line 1, channels for a first portion of a band are equally spaced from each other and form contiguous adjacent channels. If amplified, these

channels produce intermodular distortion frequencies primarily in relatively narrow bands which are spaced from each other by a frequency difference equal to the frequency spacing between their carrier frequencies. Signal to noise ratio for channels in the second part of the band may be improved if channels in the second portion are offset from the frequencies where the first portion's intermodular distortion produces are concentrated. Carrier frequencies in the second portion are also spaced from each other by the same given frequency, but are located at carrier frequencies which are not spaced a multiple of the given spacing from the carriers of the first portion.

Bossard does not teach or suggest spacing frequency bins to reduce inter-bin interference. Rather, Bossard, as discussed above, offsets a second portion of a band from a first portion to reduce intermodular distortion produced by the transmitter. In contrast, inter-bin interference is the manifestation of loss of orthogonality between different bins.

Independent claim 41 recites spacing at least one frequency bin belonging to a user to at least one sufficiently different frequency to reduce inter-bin interference. As discussed above and as acknowledge by the Examiner, Gardner does not teach or suggest spacing the frequency bins to reduce inter-bin interference. In addition, as discussed above, Bossard does not overcome at least this shortcoming of Gardner. Thus, neither Gardner nor Bossard, alone or in combination, teach or suggest at elements of claim 41. Consequently, independent claim 41 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claims 42-43 under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Ward. Claim 42 has been cancelled to simplify the issues

before the Examiner in the present application. The Applicant reserves the right to pursue the subject matter of claim 42 at a later time.

Turning now to claim 43, With regard to Gardner, the Examiner recites in the Office Action that Gardner does not teach allocating frequency bins between users such that the direction of signal arrival to adjacent frequency bins differ.

Ward generally relates to floating transceiver assignment for cellular radio. More specifically, as described beginning at col. 3, line 41, Ward discloses serving a cell with a plurality of directional beams, each capable of operating at a plurality of carrier frequencies, wherein the carrier frequencies can be floated across the plurality of beams, so as to allocate at any one time any carrier frequency to any one beam. That is, a specific frequency may be allocated to a particular beam and the frequency may be floated to another beam.

However, Ward does not teach or suggest allocating frequency bins between users such that the direction of signal arrival to adjacent frequency bins differ. Ward makes no mention of using the direction of signal arrival, nor does Ward disclose different directions of signal arrival for adjacent bins.

Thus, the limitation recited in claim 43 assigning a user to a frequency bin based at least in part on the directions of signal arrival such that directions of signal arrival for adjacent frequency bins differ is not shown in either Gardner or Ward. With regard to Gardner, the Examiner states in the Office action that the claim limitation is not shown. With regard to Ward, as discussed above, Ward makes no mention of using the direction of signal arrival, nor does Ward disclose different directions of signal arrival for adjacent bins. Consequently, independent claim 43 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 44 under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Song.

With regard to Gardner, the Examiner recites in the Office Action that Gardner does not teach using signal power information to distribute bins within frequency blocks.

Song generally relates to channel assignment method for multi-FA CDMA cellular systems. More specifically, as discussed beginning at paragraph [0017], Song discusses assigning a traffic channel for a mobile station in a first frequency assignment if the received power is less than a first threshold value and, if not, searching a second frequency assignment.

However, Song does not teach or suggest using signal power information to distribute bins within frequency blocks. Rather, Song relates to the selection of a traffic channel for a mobile station, not distributing bins within frequency blocks.

Thus, the limitation recited in claim 44 of using signal power information to distribute bins within frequency blocks is not shown in either Gardner or Song. With regard to Gardner, the Examiner states in the Office action that the claim limitation is not shown. With regard to Song, as discussed above, Song discusses selection of a traffic channel based on received power. Song makes no mention of using signal power information to distribute bins within frequency blocks. Consequently, independent claim 44 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the objection of claims 2-6 because of an informality. The Examiner stated that the preamble of claims 2-6 were confusing. Claims 2-6 have been amended as suggested by the Examiner to read "The communication system of claim 1." In view of this

amendment, the Applicant respectfully requests the Examiner withdraw the objection regarding claims 2-6.

The Applicant now turns to the Examiner's requirement for new corrected drawings in compliance with 37 C.F.R. 1.121(d) were required. By this Amendment, six replacement drawing sheets including formal drawings have been provided. The Applicant respectfully submits that the replacement drawings sheets are in compliance with 37 C.F.R. 1.121(d) and do not contain new matter.

The Applicant now turns to the rejection of claims 42-43 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424. As discussed above, claim 42 has been cancelled. A Terminal Disclaimer in favor of U.S. Pat. No. 6,795,424 is enclosed. Consequently, the applicant respectfully submits that the present double patenting rejection has been traversed.

The Applicant now turns to the rejection of claims 41 and 44 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424 in view of Bossard. A Terminal Disclaimer in favor of U.S. Pat. No. 6,795,424 is enclosed. Consequently, the applicant respectfully submits that the present double patenting rejection has been traversed.

Approved for use through 7/31/2006. OMB 0891-0031
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2005 (Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)		Docket Number (Optional) 11722US02
Application Number 09/875,518		Filed October 11, 2001
For Method and Apparatus for Interference Suppression in Orthogonal Frequency Division Multiplexing (OFDM) Wireless Communication Systems		
Art Unit 2661		Examiner Robert W. Wilson

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This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):


	Fee	Small Entity Fee	
<input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$120	\$60	\$120.00
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$450	\$225	\$ _____
<input type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1020	\$510	\$ _____
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$1590	\$795	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$2160	\$1080	\$ _____

- ☐ Applicant claims small entity status. See 37 CFR 1.27.
- ☐ A check in the amount of the fee is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 13-0017. I have enclosed a duplicate copy of this sheet.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

- I am the ☐ applicant/inventor.
- ☐ assignee of record of the entire interest. See 37 CFR 3.71
- Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).
- ☒ attorney or agent of record. Registration Number 56,898
- ☐ attorney or agent under 37 CFR 1.34.

Registration number if acting under 37 CFR 1.34, _____.



Signature
Adam J. Faler

Typed or printed name

February 10, 2006

Date
312-775-8000

Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

- ☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(e). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 39 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 5 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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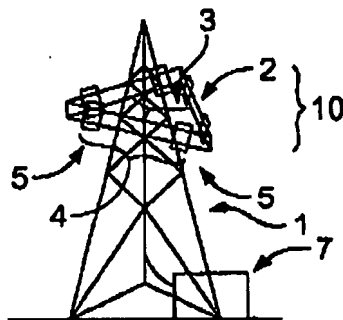


FIG. 1A

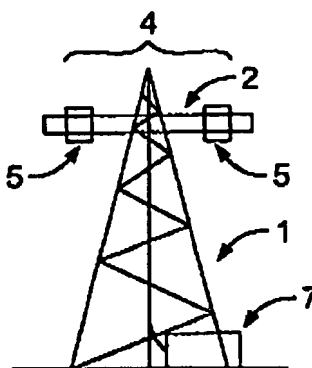


FIG. 1B

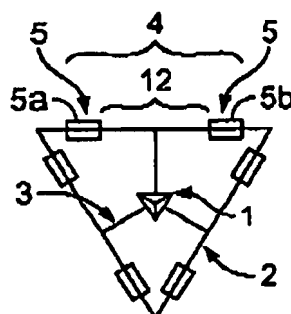


FIG. 1C

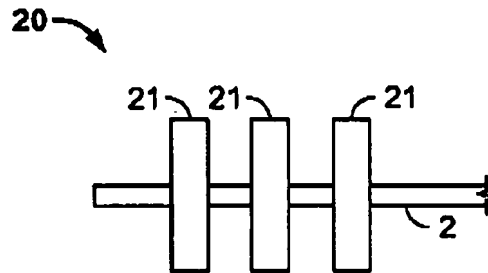


FIG. 2A

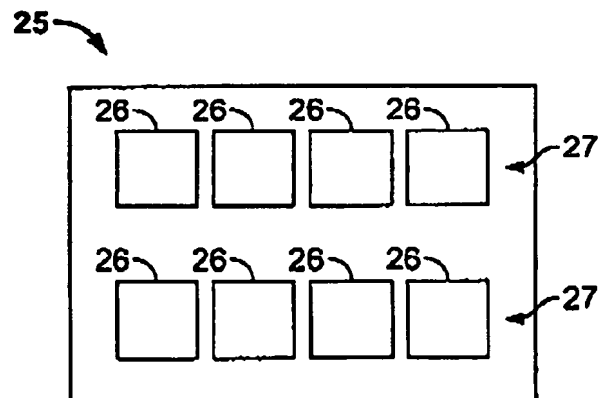


FIG. 2B

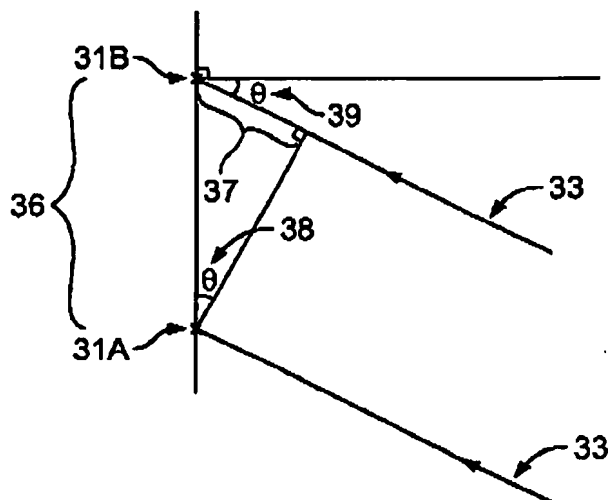


FIG. 3

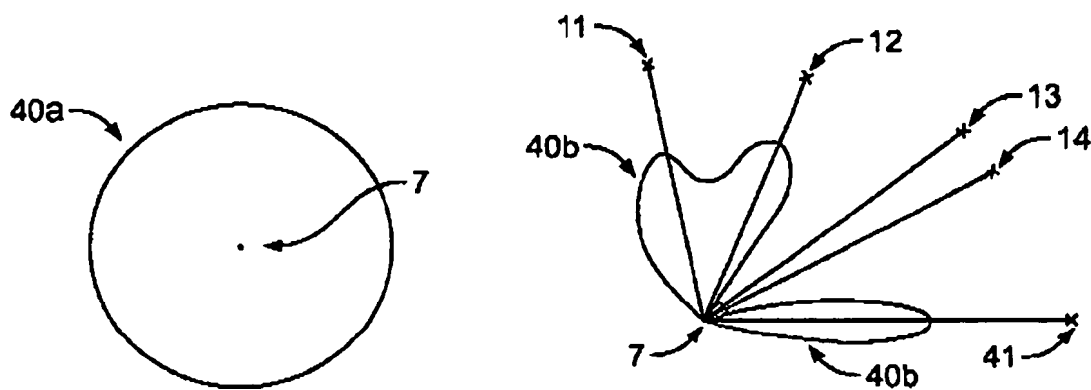


FIG. 4A

FIG. 4B

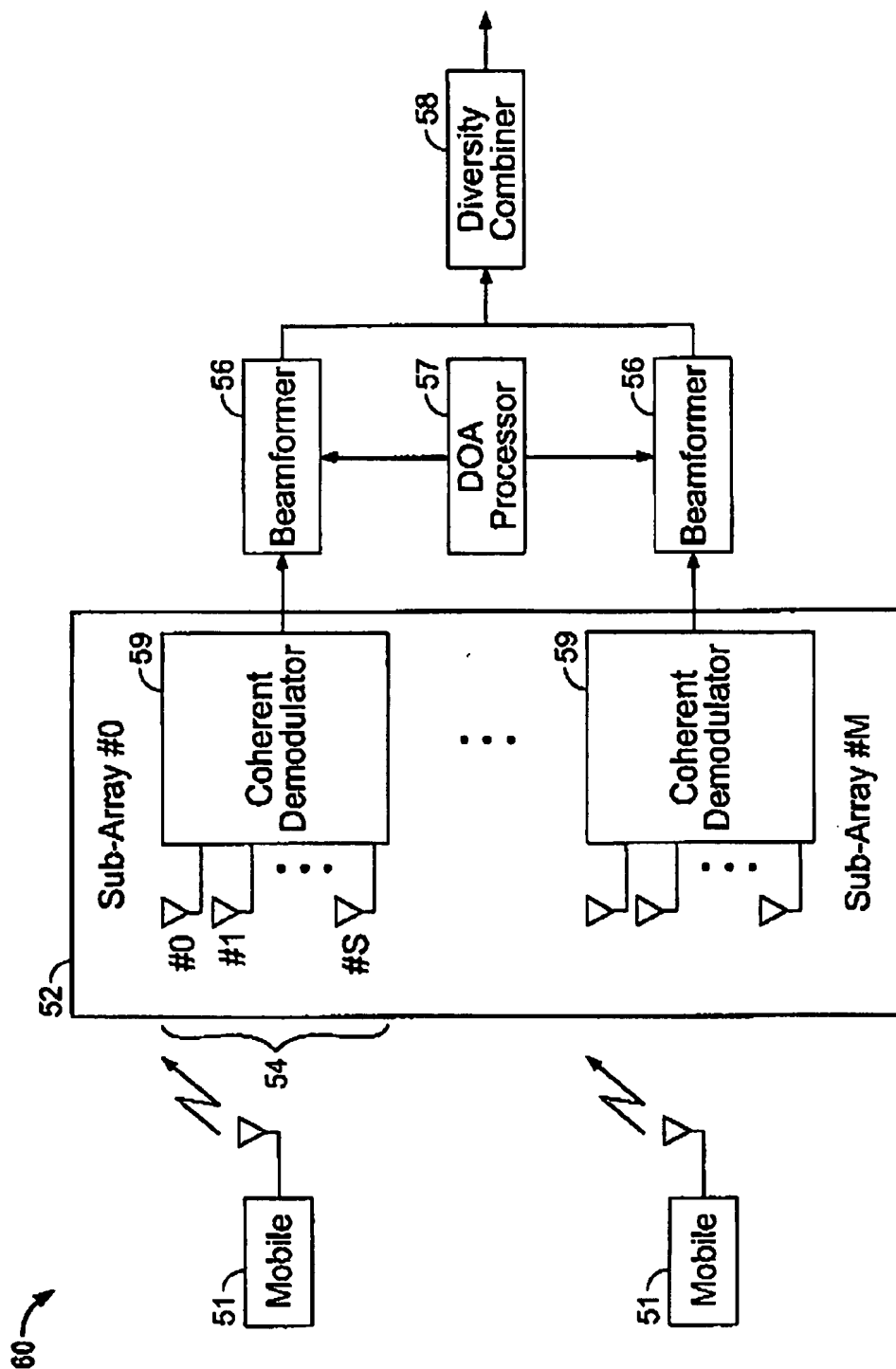


FIG. 5

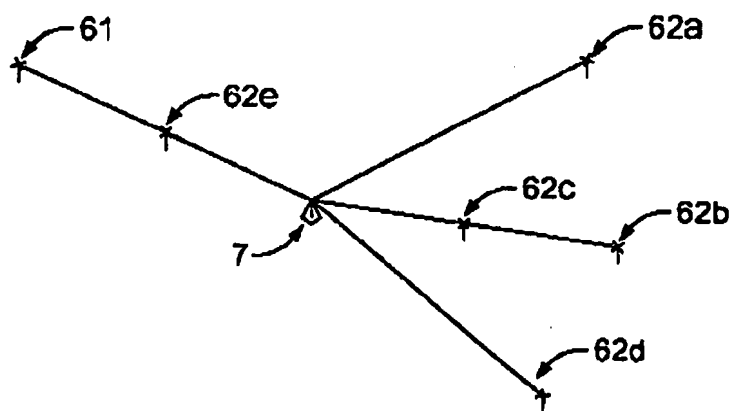


FIG. 6

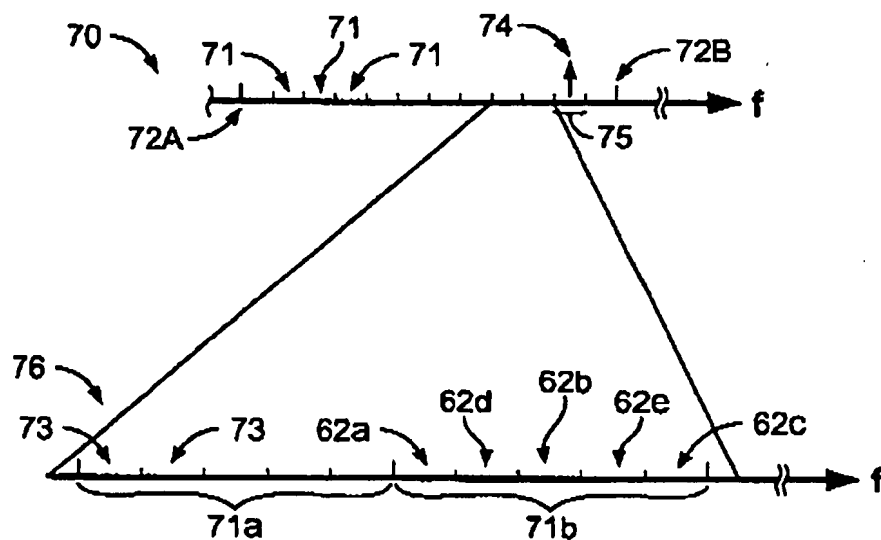


FIG. 7

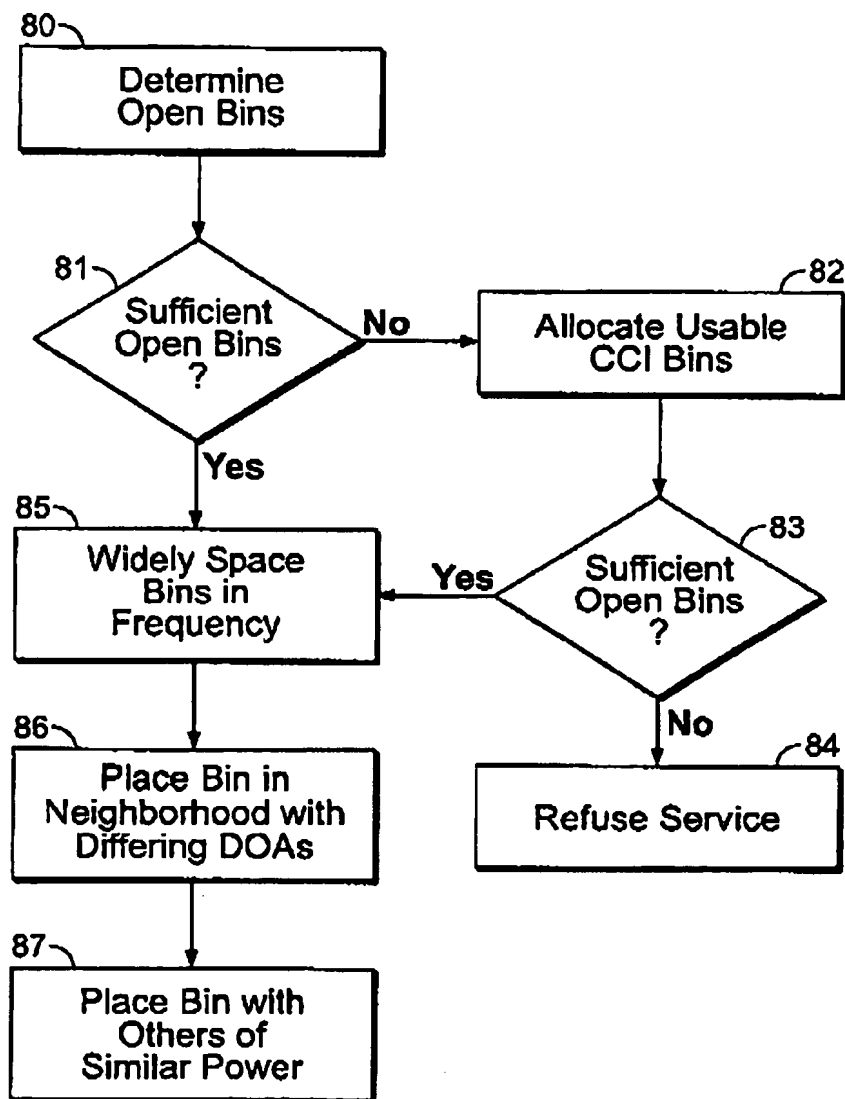


FIG. 8

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TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT

Docket Number (Optional)
 11722US02

In re Application of: Samir Kapoor et al.

Application No. 09/975,518

Filed: October 11, 2001

For: METHOD AND APPARATUS FOR INTERFERENCE SUPPRESSION IN ORTHOGONAL FREQUENCY DIVISION
 MULTIPLEXING (OFDM) WIRELESS COMMUNICATION SYSTEMS

The owner, Tellabs Operations, Inc., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term prior patent No. 6,795,424 as the term of said prior patent is defined in 35 U.S.C. 154 and 173, and as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 and 173 of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code.



APPENDIX B

Auto-Reply Facsimile Transmission



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CLIENT:	1021	MATTER:	11722US02

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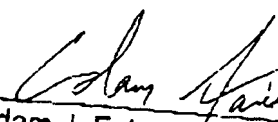
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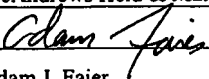
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Adam J. Faier

TRANSMITTAL FORM (to be used for all correspondence after initial filing)		Application Number		09/957,518	
		Filing Date		October 11, 2001	
		First Named Inventor		Samir Kapoor	
		Art Unit		2661	
		Examiner Name		Robert W. Wilson	
Total Number of Pages in This Submission		27	Attorney Docket Number		11722US02
ENCLOSURES (check all that apply)					
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Signature			Date	February 10, 2006	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of:

Samir Kapoor et al.

Serial No.: 09/975,518

Filed: October 11, 2001

For: METHOD AND APPARATUS FOR
INTERFERENCE SUPPRESSION IN
ORTHOGONAL FREQUENCY
DIVISION MULTIPLEXING (OFDM)
WIRELESS COMMUNICATION
SYSTEMS

Examiner: Wilson, Robert W.

Group Art Unit: 2661

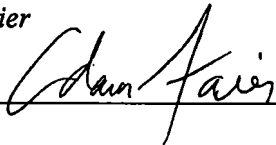
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Adam J. Faier

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AMENDMENT

Mail Stop Amendment
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Alexandria, VA 22313-1450

Dear Examiner Wilson:

This Amendment is being submitted in response to the Office Action mailed October 27, 2005. This Amendment is timely because it is being submitted with a one month extension of time to extend the period for reply until February 27, 2006. The Applicant requests that this Amendment be entered and considered.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) In a multi-point communications system having a receiver and transmitter disposed at a primary site for communication with a plurality of remote units disposed at respective secondary sites, an antenna comprising:

multiple elements for receiving communications signals over a carrier frequency from ~~[[a]]~~ said plurality of remote units, said elements being partitioned into a plurality of groups disposed remote from one another by at least a predetermined minimum group spacing sufficient to obtain spatial diversity, each group containing at least one element, at least one group including multiple elements located proximate to one another and no further apart than a predetermined maximum element spacing to facilitate spatial filtering.

2. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said predetermined maximum element spacing is no more than one-half times a wavelength corresponding to the carrier frequency.

3. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said predetermined minimum group spacing is at least five times a wavelength corresponding to the carrier frequency.

4. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said multiple elements constitute an adaptive antenna array and each group constitutes a sub-array.

5. (Currently Amended) The ~~antenna~~ communication system of claim 1, further comprising means for electronically steering said multiple elements.

6. (Currently Amended) The ~~antenna~~ communication system of claim 1, wherein said multiple elements constitute a switched beam antenna array.

7-28. (Cancelled)

29. (Currently Amended) A multi-point communications network comprising:
a receiver and transmitter disposed at a primary site;

a plurality of remote units disposed at respective secondary sites for communication with said receiver and transmitter at said primary site;

said primary site having an antenna including multiple elements for receiving communications signals over a carrier frequency from ~~[[a]]~~ said plurality of remote units, said elements being partitioned into a plurality of groups disposed remote from one another by at least a predetermined minimum group spacing sufficient to obtain spatial diversity, each group containing at least one element, at least one group including multiple elements located proximate to one another and no further apart than a predetermined maximum element spacing to facilitate spatial filtering.

30. (Original) The network of claim 29, wherein said predetermined maximum element spacing is no more than one-half times a wavelength corresponding to the carrier frequency.

31. (Original) The network of claim 29, wherein said predetermined minimum group spacing is at least five times a wavelength corresponding to the carrier frequency.

32. (Original) The network of claim 29, wherein said multiple elements constitute an adaptive antenna array and each group constitutes a sub-array.

33. (Original) The network of claim 29, wherein said antenna further comprises means for electronically steering said multiple elements.

34. (Original) The network of claim 29, wherein said multiple elements constitute a switched beam antenna array.

35. (Currently Amended) An adaptive antenna array architecture for communication, said architecture comprising:

a plurality of adaptive antenna arrays for signal reception, wherein said plurality of antenna arrays comprise a plurality of sub-arrays, wherein each sub-array includes at least two elements, wherein elements in said sub-arrays are no further apart than a predetermined maximum element spacing to facility spatial filtering, wherein said sub-arrays are spaced to obtain spatial diversity;

an array fixation structure for mounting said plurality of adaptive antenna arrays;

an array support structure for positioning said array fixation structure at a desired elevation; and

a base station for controlling said adaptive antenna array architecture.

36. (Cancelled)

37. (Cancelled)

38. (Previously Presented) A signal receiver for receiving communications signals, said receiver comprising:

an adaptive array for receiving signals from remote units;

a plurality of demodulator units for processing said signals;

a plurality of beamformers for constructing a desired signal response; and

a spatial diversity combiner for removing interference from said signals.

39. (Previously Presented) The receiver of claim 38, further comprising a direction of arrival processor for calculating a direction of arrival for said signals.

40. (Previously Presented) The receiver of claim 38, further comprising an orthogonal frequency division multiple access unit for segmenting available bandwidth into a plurality of frequency bins for allocation.

41. (Previously Presented) A method for reducing signal interference, said method comprising:

assigning at least one frequency bin to a user;

spacing said at least one frequency bin belonging to said user to at least one sufficiently different frequency to reduce inter-bin interference; and

locating said at least one frequency bin with at least one frequency bin of other users such that directions of arrival for said users are distinctly separable.

42. (Cancelled)

43. (Currently Amended) A method for allocating communication bandwidth, said method comprising:

determining a first direction of signal arrival for a first remote user and a second direction of signal arrival for a second remote user;

assigning [[a]] said first remote user to a first frequency bin; and

assigning [[a]] said second remote user to a second frequency bin based at least in part on said directions of signal arrival such that directions of signal arrival for adjacent frequency bins differ.

44. (Previously Presented) A method for avoiding interference in communications signals, said method comprising:

partitioning available bandwidth into a plurality of frequency blocks, said frequency blocks comprising a plurality of bins;

assigning a user to a bin in each of said frequency blocks; and

using signal power information to distribute said bins within said frequency blocks.

AMENDMENTS TO THE DRAWINGS

Six sheets of drawings are attached. These drawing sheets include formal drawings and replace the prior informal drawings originally submitted.

Attachment: Six (6) Replacement Sheets

REMARKS

The present application includes claims 1-6 and 29-44. Claims 1-6 and 29-44 have been rejected by the Examiner. Claims 2-6 were objected to. By this Amendment, claims 1-6, 29, 35 and 43 have been amended. By this amendment, claims 36-37 and 42 have been cancelled.

Claims 1-6 and 29-34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti et al., U.S. Pat. No. 5,933,421 ("Alamouti") in view of Gardner et al., U.S. Pat. No. 5,260,968 ("Gardner").

Claims 35-36 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece et al., U.S. Pat. No. 5,771,024 ("Reece").

Claim 37 was rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece further in view of Gardner.

Claims 38-39 were rejected under 35 U.S.C. 102(b) as being anticipated by Paulraj et al., U.S. Pat. No. 5,345,599 ("Paulraj").

Claim 40 was rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Gardner.

Claim 41 was rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Bossard, U.S. Pat. No. 5,983,078 ("Bossard").

Claims 42-43 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Ward et al., U.S. Pat. No. 6,104,930 ("Ward").

Claim 44 was rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Song et al., U.S. Pat. Pub. No. 2003/0193917 ("Song").

Claims 2-6 were objected to because of an informality.

New corrected drawings in compliance with 37 C.F.R. 1.121(d) were required.

Claims 42-43 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424.

Claims 41 and 44 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424 in view of Bossard.

The Applicant now turns to the rejection of claims 1-6 and 29-34 under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Gardner. Alamouti generally relates to frequency division duplex communications. However, as noted by the Examiner in the Office Action, Alamouti does not teach the limitations recited in claims 1 and 29 of a single antenna including a plurality of groups spaced apart sufficiently to provide spatial diversity AND at least one group including a plurality of antenna elements spaced closely enough to provide spatial filtering.

More specifically, claims 1 and 29 recite an antenna structure, wherein the antenna structure includes a plurality of antenna element groups. The plurality of groups are spaced apart at a distance sufficient to provide spatial diversity. However, at least one group includes a plurality of antenna elements. Within the group, the antenna elements are spaced close enough together to provide spatial filtering. Thus, there are two constraints (the group spacing and the element spacing), that are met in the single antenna that is recited in claims 1 and 29. Conversely, prior art antennas were typically designed to meet only one of the two constraints and not both.

Thus, Gardner teaches, at col. 6, lines 5-26, separating antennas by about half of the wavelength. Gardner specifically differentiates itself from the prior art which it mentions teaches spacing the antennas many wavelengths apart. Thus, Gardner chooses to optimize a different constraint than the prior art. However, neither Gardner nor the prior art it references teaches designing an antenna to simultaneously meet BOTH design constraints. Conversely, both Gardner and the prior art are designed to only meet one or the other of the two design constraints identified above.

Thus, the limitations recited in independent claims 1 and 29 of a single antenna including a plurality of groups spaced apart sufficiently to provide spatial diversity AND at least one group including a plurality of antenna elements spaced closely enough to provide spatial filtering are not shown in the either Alamouti or Gardner. With regard to Alamouti, the Examiner states in the Office Action that the claim limitation is not shown. With regard to Gardner, Gardner only teaches an antenna designed to meet one constraint, not both.

Consequently, independent claims 1 and 29, and their corresponding dependent claims 2-6 and 30-34, are respectfully submitted to be in condition for allowance. Similarly, independent claim 35 has been amended to recite similar limitations to the limitations in claims 1 and 29 and is consequently also respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claims 35-36 under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece. Independent claim 35 has been amended to incorporate the limitations similar to those in claims 1 and 29 discussed above. The limitations added to claim 35 were similar to the limitations recited in dependent claims 36 and 37.

Consequently, claims 36 and 37 have been cancelled. As discussed above with regard to claims 1 and 29, amended claim 35 is also respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 37 under 35 U.S.C. 103(a) as being unpatentable over Alamouti in view of Reece further in view of Gardner. Claim 37 has been cancelled.

The Applicant now turns to the rejection of claims 38-39 under 35 U.S.C. 102(b) as being anticipated by Paulraj. Paulraj generally relates to increasing capacity in wireless broadcast systems using distributed transmission/directional reception. More specifically, as illustrated in Fig. 5 and discussed beginning at col. 7, line 68, Paulraj discusses that the spatial filter consists of d processing channels, one for each transmitted signal, where each processing channel selectively passes the one desired signal and rejects other interfering signals. That is, the spatial filter in Paulraj does not combine the signals. Rather, the output signals from the spatial filter are processed into d substreams corresponding to the outputs of the signal splitter at the transmitting side. The substreams are fed into a combiner which merges the streams. As explained at col. 10, lines 28-36, the substreams are combined to obtain the estimated source stream. The combiner essentially reverses the operation of the signal splitter on the transmitting side. That is, the combiner in Paulraj does not remove interference from signals.

However, Paulraj does not disclose a combiner for removing interference from signals. Rather, as discussed above, Paulraj merely discloses a spatial filter including processing channels that selectively pass one desired signal while rejecting other interfering signals. Further, the

combiner in Paulraj merely combines substreams to obtain the estimated source stream. Thus, Paulraj does not disclose a combiner for removing interference from signals.

Independent claim 38 recites a spatial diversity combiner for removing interference from signals. As discussed above, Paulraj does not teach a spatial diversity combiner. Consequently, independent claim 38 and corresponding dependent claim 39 are respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 40 under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Gardner.

As discussed above, Paulraj generally relates to increasing capacity in wireless broadcast systems using distributed transmission/directional reception. However, as discussed above, Paulraj does not disclose a combiner for removing interference from signals. Rather, as discussed above, Paulraj merely discloses a spatial filter including processing channels that selectively pass one desired signal while rejecting other interfering signals.

As discussed above, Gardner generally relates to multiplexing communications signals through blind adaptive spatial filtering. Gardner discusses beginning at col. 13, line 45, a splitter/combiner coupled to an antenna in an antenna array. The splitter/combiner includes a pair of bandpass filters, the outputs of which are coupled to a controller. The splitter/combiner is used to separate the spectrally disjoint control signals received from and transmitted to the mobile user and to separate the control channel from the band occupied by active users. The control channel is used for call initiation and coordination between the user and the base station.

However, Gardner does not disclose a combiner for removing interference from signals. Rather, as discussed above, the combiner disclosed in Gardner is used to separate control signals received from and sent to remote users.

Independent claim 38, from which claim 40 depends, recites a spatial diversity combiner for removing interference from signals. As discussed above, Paulraj does not teach such a spatial diversity combiner. Further, as discussed above, Gardner does not teach such a spatial diversity combiner. Thus, neither Paulraj nor Gardner, alone or in combination, teach or suggest elements of claim 40. Consequently, dependent claim 40 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 41 under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Bossard.

As discussed above, Gardner generally relates to multiplexing communications signals through blind adaptive spatial filtering. However, the Applicant agrees with the Examiner's statement in the Office Action that Gardner does not teach or suggest spacing the frequency bins to reduce inter-bin interference.

Bossard generally relates to channel spacing for distortion reduction. More specifically, as explained at col. 1, lines 17-22, Bossard relates to transmitting multiple signals over a large number of channels, where two or more of the channels are affected by a component which produces intermodular distortion from the interaction of the signals of these channels. That is, intermodular distortion in Bossard is produced by the transmitting component that is transmitting many signals. Bossard discusses beginning at col. 2, line 1, channels for a first portion of a band are equally spaced from each other and form contiguous adjacent channels. If amplified, these

channels produce intermodular distortion frequencies primarily in relatively narrow bands which are spaced from each other by a frequency difference equal to the frequency spacing between their carrier frequencies. Signal to noise ratio for channels in the second part of the band may be improved if channels in the second portion are offset from the frequencies where the first portion's intermodular distortion produces are concentrated. Carrier frequencies in the second portion are also spaced from each other by the same given frequency, but are located at carrier frequencies which are not spaced a multiple of the given spacing from the carriers of the first portion.

Bossard does not teach or suggest spacing frequency bins to reduce inter-bin interference. Rather, Bossard, as discussed above, offsets a second portion of a band from a first portion to reduce intermodular distortion produced by the transmitter. In contrast, inter-bin interference is the manifestation of loss of orthogonality between different bins.

Independent claim 41 recites spacing at least one frequency bin belonging to a user to at least one sufficiently different frequency to reduce inter-bin interference. As discussed above and as acknowledge by the Examiner, Gardner does not teach or suggest spacing the frequency bins to reduce inter-bin interference. In addition, as discussed above, Bossard does not overcome at least this shortcoming of Gardner. Thus, neither Gardner nor Bossard, alone or in combination, teach or suggest at elements of claim 41. Consequently, independent claim 41 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claims 42-43 under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Ward. Claim 42 has been cancelled to simplify the issues

before the Examiner in the present application. The Applicant reserves the right to pursue the subject matter of claim 42 at a later time.

Turning now to claim 43, With regard to Gardner, the Examiner recites in the Office Action that Gardner does not teach allocating frequency bins between users such that the direction of signal arrival to adjacent frequency bins differ.

Ward generally relates to floating transceiver assignment for cellular radio. More specifically, as described beginning at col. 3, line 41, Ward discloses serving a cell with a plurality of directional beams, each capable of operating at a plurality of carrier frequencies, wherein the carrier frequencies can be floated across the plurality of beams, so as to allocate at any one time any carrier frequency to any one beam. That is, a specific frequency may be allocated to a particular beam and the frequency may be floated to another beam.

However, Ward does not teach or suggest allocating frequency bins between users such that the direction of signal arrival to adjacent frequency bins differ. Ward makes no mention of using the direction of signal arrival, nor does Ward disclose different directions of signal arrival for adjacent bins.

Thus, the limitation recited in claim 43 assigning a user to a frequency bin based at least in part on the directions of signal arrival such that directions of signal arrival for adjacent frequency bins differ is not shown in either Gardner or Ward. With regard to Gardner, the Examiner states in the Office action that the claim limitation is not shown. With regard to Ward, as discussed above, Ward makes no mention of using the direction of signal arrival, nor does Ward disclose different directions of signal arrival for adjacent bins. Consequently, independent claim 43 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the rejection of claim 44 under 35 U.S.C. 103(a) as being unpatentable over Gardner in view of Song.

With regard to Gardner, the Examiner recites in the Office Action that Gardner does not teach using signal power information to distribute bins within frequency blocks.

Song generally relates to channel assignment method for multi-FA CDMA cellular systems. More specifically, as discussed beginning at paragraph [0017], Song discusses assigning a traffic channel for a mobile station in a first frequency assignment if the received power is less than a first threshold value and, if not, searching a second frequency assignment.

However, Song does not teach or suggest using signal power information to distribute bins within frequency blocks. Rather, Song relates to the selection of a traffic channel for a mobile station, not distributing bins within frequency blocks .

Thus, the limitation recited in claim 44 of using signal power information to distribute bins within frequency blocks is not shown in either Gardner or Song. With regard to Gardner, the Examiner states in the Office action that the claim limitation is not shown. With regard to Song, as discussed above, Song discusses selection of a traffic channel based on received power. Song makes no mention of using signal power information to distribute bins within frequency blocks. Consequently, independent claim 44 is respectfully submitted to be in condition for allowance.

The Applicant now turns to the objection of claims 2-6 because of an informality. The Examiner stated that the preamble of claims 2-6 were confusing. Claims 2-6 have been amended as suggested by the Examiner to read "The communication system of claim 1." In view of this

amendment, the Applicant respectfully requests the Examiner withdraw the objection regarding claims 2-6.

The Applicant now turns to the Examiner's requirement for new corrected drawings in compliance with 37 C.F.R. 1.121(d) were required. By this Amendment, six replacement drawing sheets including formal drawings have been provided. The Applicant respectfully submits that the replacement drawings sheets are in compliance with 37 C.F.R. 1.121(d) and do not contain new matter.

The Applicant now turns to the rejection of claims 42-43 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424. As discussed above, claim 42 has been cancelled. A Terminal Disclaimer in favor of U.S. Pat. No. 6,795,424 is enclosed. Consequently, the applicant respectfully submits that the present double patenting rejection has been traversed.

The Applicant now turns to the rejection of claims 41 and 44 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of U.S. Pat. No. 6,795,424 in view of Bossard. A Terminal Disclaimer in favor of U.S. Pat. No. 6,795,424 is enclosed. Consequently, the applicant respectfully submits that the present double patenting rejection has been traversed.

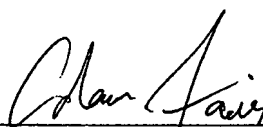
CONCLUSION

It is submitted that the present application is in condition for allowance and a Notice of Allowability is respectfully requested. If the Examiner has any questions or the Applicant can be of any assistance, the Examiner is invited and encouraged to contact the Applicant at the number below.

The Commissioner is authorized to charge any necessary fees or credit any overpayment to the Deposit Account of McAndrews, Held & Malloy, Account No. 13-0017.

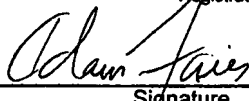
Respectfully submitted,

Date: February 10, 2006




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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2005 <i>(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)</i>		Docket Number (Optional) 11722US02																								
Application Number 09/975,518		Filed October 11, 2001																								
For Method and Apparatus for Interference Suppression in Orthogonal Frequency Division Multiplexing (OFDM) Wireless Communication Systems																										
Art Unit 2661		Examiner Robert W. Wilson																								
<p>This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.</p> <p>The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):</p> <table style="width: 100%; border-collapse: collapse;"><thead><tr><th></th><th style="text-align: center;"><u>Fee</u></th><th colspan="2" style="text-align: center;"><u>Small Entity Fee</u></th></tr></thead><tbody><tr><td><input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))</td><td style="text-align: center;">\$120</td><td style="text-align: center;">\$60</td><td style="text-align: center;">\$120.00</td></tr><tr><td><input type="checkbox"/> Two months (37 CFR 1.17(a)(2))</td><td style="text-align: center;">\$450</td><td style="text-align: center;">\$225</td><td style="text-align: center;">\$ _____</td></tr><tr><td><input type="checkbox"/> Three months (37 CFR 1.17(a)(3))</td><td style="text-align: center;">\$1020</td><td style="text-align: center;">\$510</td><td style="text-align: center;">\$ _____</td></tr><tr><td><input type="checkbox"/> Four months (37 CFR 1.17(a)(4))</td><td style="text-align: center;">\$1590</td><td style="text-align: center;">\$795</td><td style="text-align: center;">\$ _____</td></tr><tr><td><input type="checkbox"/> Five months (37 CFR 1.17(a)(5))</td><td style="text-align: center;">\$2160</td><td style="text-align: center;">\$1080</td><td style="text-align: center;">\$ _____</td></tr></tbody></table> <p><input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.</p> <p><input type="checkbox"/> A check in the amount of the fee is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number <u>13-0017</u>. I have enclosed a duplicate copy of this sheet.</p> <p>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</p> <p>I am the <input type="checkbox"/> applicant/inventor. <input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71</p> <p style="text-align: center;">Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).</p> <p><input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>56,898</u></p> <p><input type="checkbox"/> attorney or agent under 37 CFR 1.34.</p> <p style="text-align: center;">Registration number if acting under 37 CFR 1.34. _____</p> <div style="display: flex; justify-content: space-between;"><div style="width: 45%; text-align: center;"> _____ Signature Adam J. Faier _____ Typed or printed name</div><div style="width: 45%; text-align: center;"><u>February 10, 2006</u> _____ Date <u>312-775-8000</u> _____ Telephone Number</div></div> <p>NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.</p> <p><input type="checkbox"/> Total of _____ forms are submitted.</p>				<u>Fee</u>	<u>Small Entity Fee</u>		<input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$120	\$60	\$120.00	<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$450	\$225	\$ _____	<input type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1020	\$510	\$ _____	<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$1590	\$795	\$ _____	<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$2160	\$1080	\$ _____
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This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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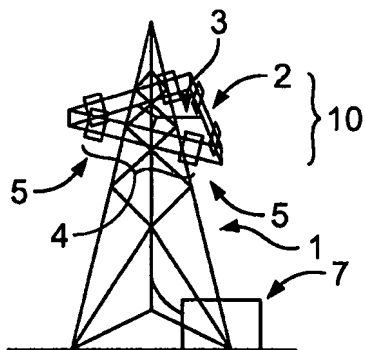


FIG. 1A

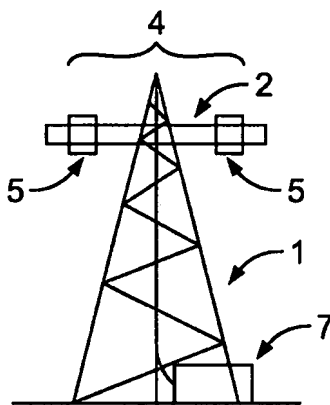


FIG. 1B

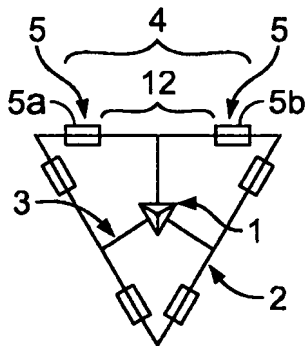


FIG. 1C

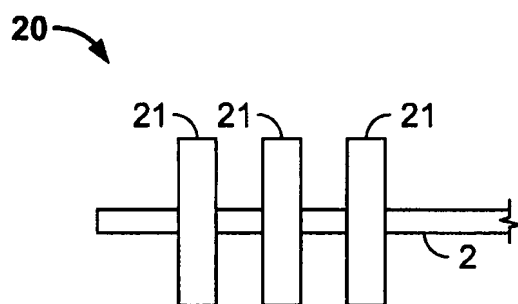


FIG. 2A

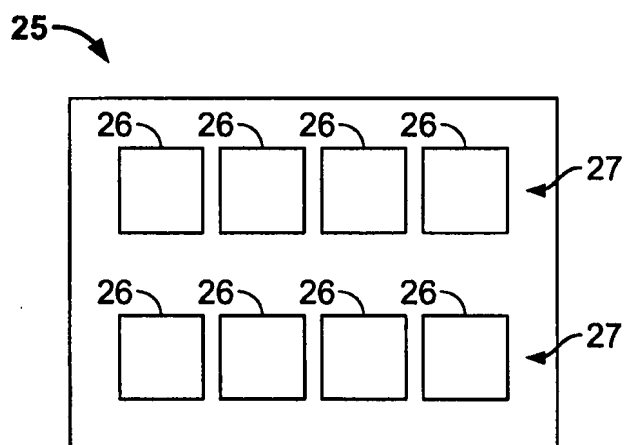


FIG. 2B

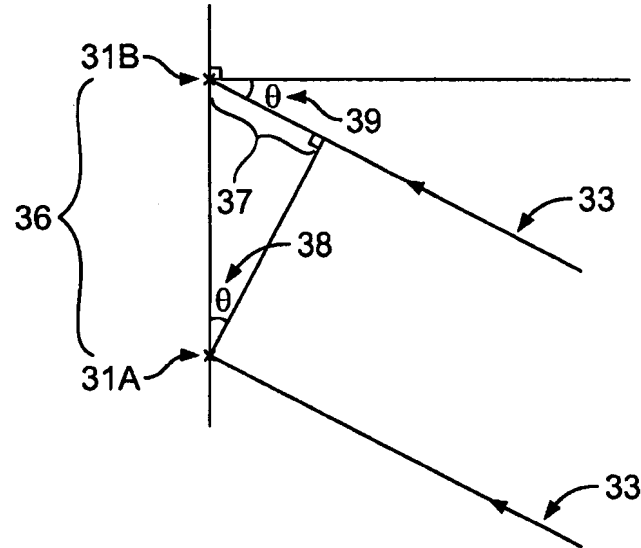


FIG. 3

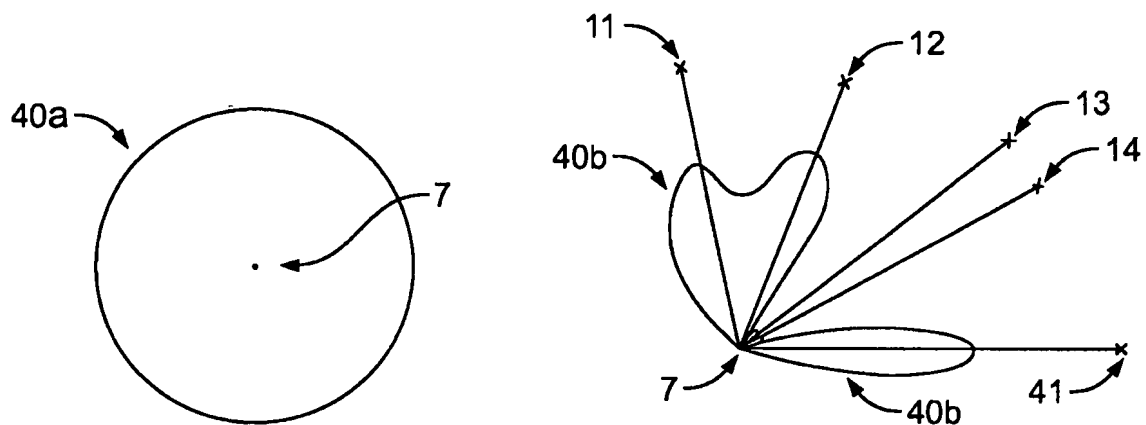


FIG. 4A

FIG. 4B

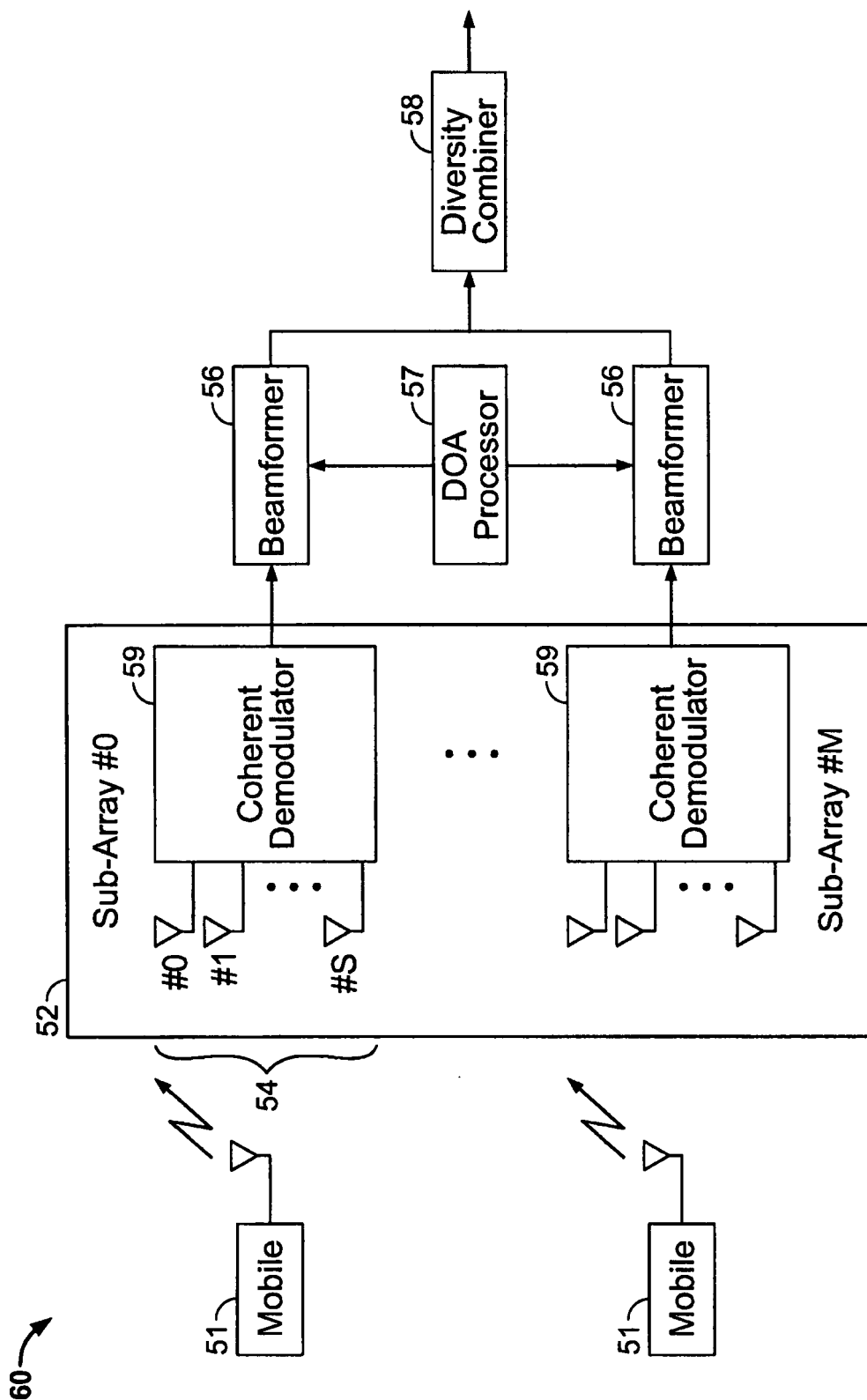


FIG. 5

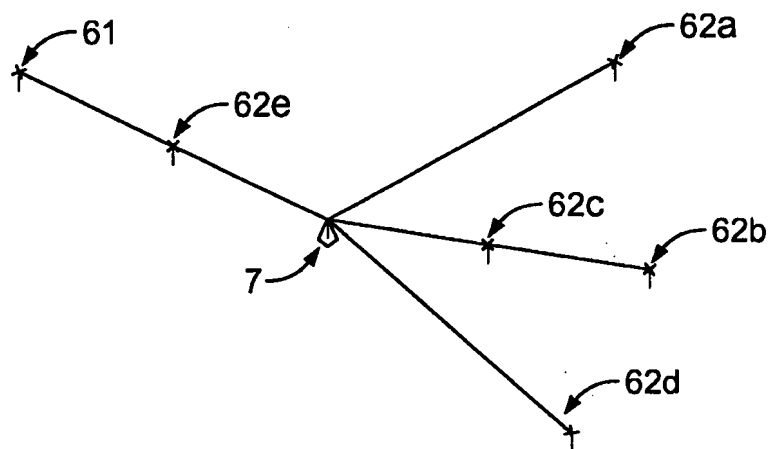


FIG. 6

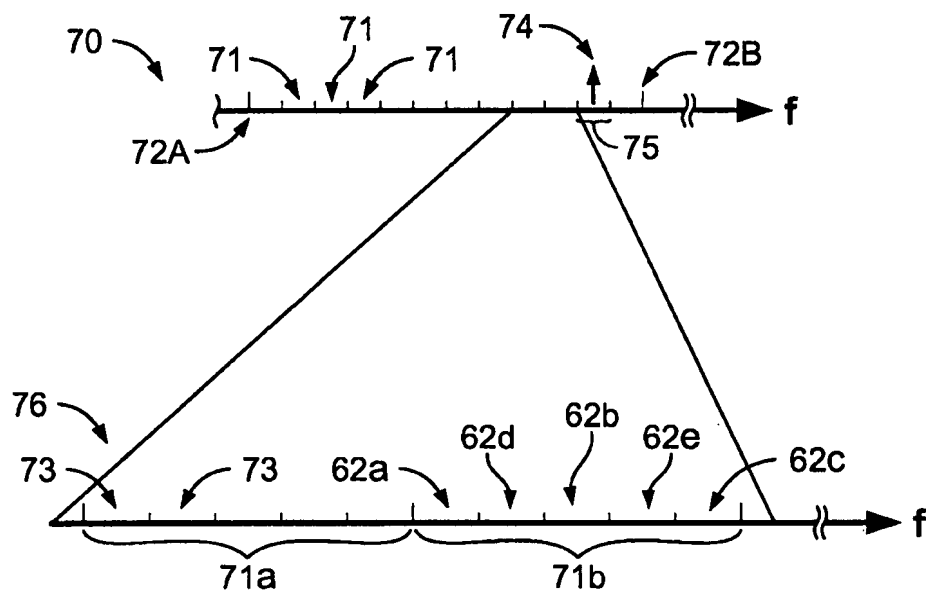


FIG. 7

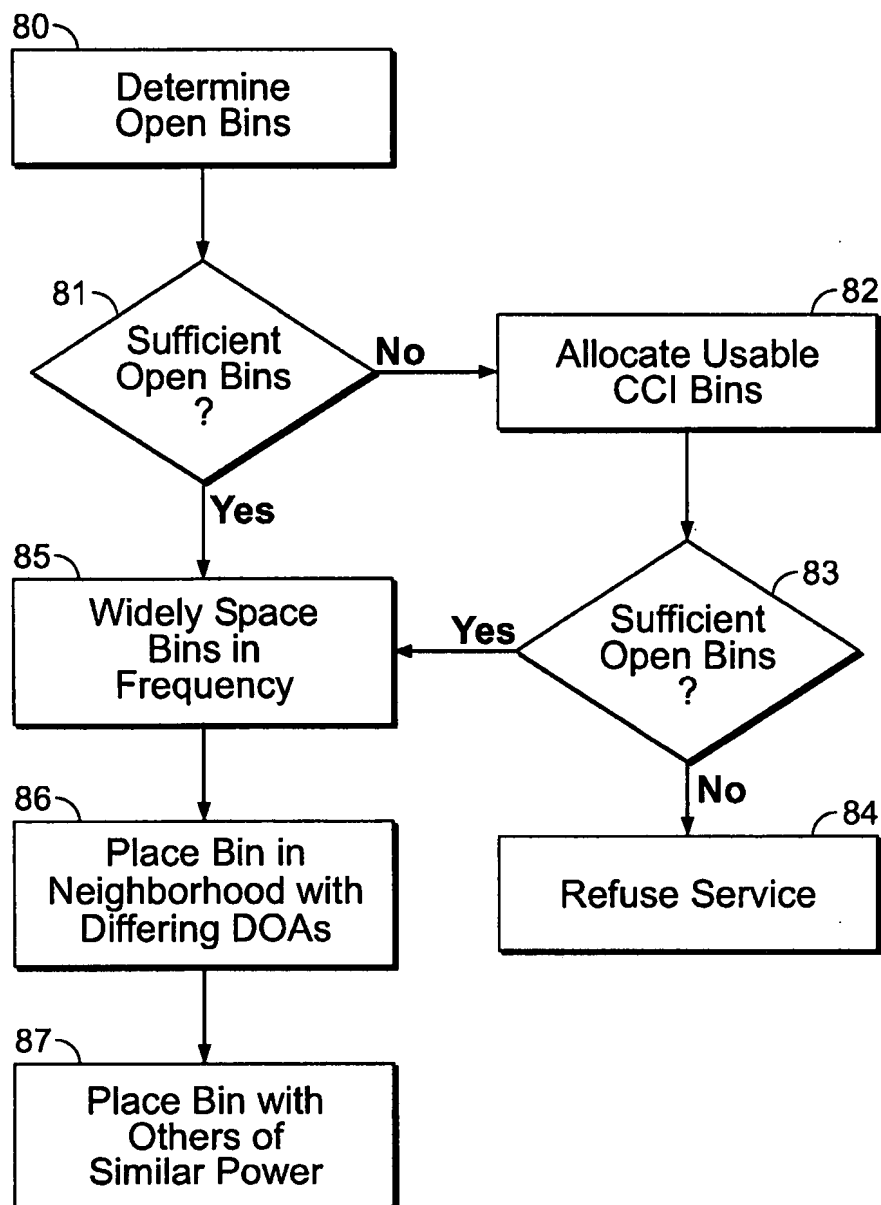


FIG. 8

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**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)
11722US02

In re Application of: Samir Kapoor et al.

Application No. 09/975,518

Filed: October 11, 2001

For: METHOD AND APPARATUS FOR INTERFERENCE SUPPRESSION IN ORTHOGONAL FREQUENCY DIVISION
MULTIPLEXING (OFDM) WIRELESS COMMUNICATION SYSTEMS

The owner*, Tellabs Operations, Inc., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term prior patent No. 6,795,424 as the term of said prior patent is defined in 35 U.S.C. 154 and 173, and as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 and 173 of the **prior patent**, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. ☒ The undersigned is an attorney of record. Reg. No. 56,898



02-10-06

Signature

Date

Adam J. Faier

Typed or printed name

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Telephone Number

- ☐ Terminal disclaimer fee under 37 CFR 1.20(d) is included.

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*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.